Required Denitrification Capacity

Required Denitrification Capacity Calculations

BOD= 268

TN= 60.3

XorgN,BM= 10.72 : The organic Nitrogen that is consumed and wasted by the wasteactivated sludge. This value is 0.04 BOD if the Sludge Retention Time (SRT) is > 10 days. (In this design it is 15 days. Therefore, XorgN,BM = 0.04 * 268 mg/L = 10.72 mg/L

Snh4, EST 1 : The effluent ammonia nitrogen value, mgL

SorgN,EST= 2 The effluent oragnic nitrogen value, mgL

Cno3EST= 7 The effluent nitrate nitrogen value, mgL

Note that the total of : Snh4, EST+ SorgN,EST + Cno3EST = 10 mg/L, limit for the total nitrogen for the sensitive zone dischrage.

The amount of nitrate to be denitrified is the TKN-in minus the nitrogen that is discharged by the waste activated sludge and the effluent (10 mg/L in tjis case)

Sno3D= Cn-XorgN,BM-Snh4EST-SorgNEST-Sno3EST= 39.58 mg/L

Required Denitrification Capacity = Sno3D / Cbod = 39.58 / 268 = 0.148

Which very close to the limit value of 0.15. If this value is greater than 0.15, there will not be enough carbon left dor the denitrification process to produce an effluent with a atotal nitrogen as 10 mg/L or less.

,Note that since the Total Nitrogen (Snh4EST-SorgNEST-Sno3EST) wanted in the effluent of the plant is 10 mg/L (Europen Dischare Standard for Sensitive Zones), we can write 10 mg/L for the term (Snh4EST-SorgNEST-Sno3EST). Since the Cn-XorgN,BM = 0.04 * Cbod,

We can write :

RDNC= Required Denitrification Capacity = Cn/Cbod – 10/Cbod – 0.04* Cbod/Cbod

Simplifying:

RDNC= TKNin / BODin – 10 / BOD in – 0.04

This last term becomes 0.05 if the SRT is less than 10 days.